

In the claims:

1. A system for environmental data management, comprising:
an application including:
 - a mapping module that generates an interactive graphical mapping interface of the site, the interactive mapping interface including links to environmental data from a site and related documents;
 - 5 an analysis module that analyzes the environmental data, the environmental data including contaminants of potential concern (COPC) data;
 - 10 a risk assessment module that assesses the human health risks caused by COPCs at the site; and,
 - a remediation module that screens remedial technology for cleaning up COPCs.
2. The system of claim 1 wherein the application further includes:
 - a three-dimensional (3D) viewer module that generates a 3D display of the site
- 15 and the environmental data.
3. The system of claim 2 wherein the 3D viewer module enables a user to define a 3D region of interest (ROI) on the 3D display.
4. The system of claim 3 wherein the risk assessment module assesses the human health risks caused by COPCs in the ROI.
- 20 5. The system of claim 3 wherein the remediation module remedial technology for cleaning up COPCs in the ROI.
6. The system of claim 2 wherein the 3D viewer modules enables a user to define a sampling period on the 3D display.
7. The system of claim 2 wherein the interactive mapping interface includes a link to
- 25 the 3D viewer module.
8. The system of claim 1 further comprising a central database that stores the environmental data from the site, wherein the application retrieves the environmental data from the central database.
9. The system of claim 8 further comprising a plurality of site monitoring systems
30 that monitor COPC readings on the site, wherein the site monitoring systems periodically communicate COPC readings to the application for storage in the central database.

10. The system of claim 9 wherein the site monitoring systems include one or more of the following: emission monitoring stations, monitoring wells, soil borings, soil vapor collection points, air dike probes, piezometer wells, and vapor extraction wells.

11. The system of claim 9 further comprising a continuous monitoring system module
5 that provides a user interface to the site monitoring systems and real-time COPC readings from the site monitoring systems.

12 The system of claim 11 wherein the interactive mapping interface includes a link to the continuous monitoring system module.

13. The system of claim 1 wherein the analysis module comprises:

10 an object analysis module that analyzes environmental data for objects of the site, wherein an object represents a physical location on the site for which environmental data is measured and stored.

14. The system of claim 13 wherein the object analysis module compares COPC concentration data for an object to a standard.

15 15. The system of claim 14 wherein the object analysis module compares COPC concentration data for an object to the standard over a period of time.

16. The system of claim 14 wherein the standard is a regulatory standard.

17. The system of claim 14 wherein the standard is a user-defined standard.

18. The system of claim 1 wherein the analysis module includes:

20 a site analysis module that analyzes environmental data on a site-wide basis.

19. The system of claim 18 wherein the site analysis module compares COPC concentration data for the entire site to a standard.

20. The system of claim 18 wherein the site analysis module compares COPC concentration data for a plurality of objects to a standard, wherein an object represents a
25 physical location on the site for which environmental data is measured and stored.

21. The system of claim 1 wherein the environmental data includes historic data and current data.

22. The system of claim 1 wherein the risk assessment module generates a risk output that includes non-carcinogenic risks and incremental lifetime cancer risks.

23. The system of claim 22 wherein the risk assessment module maps the risk output on the GIS map of the site, illustrating the levels of health risk on the site or ROI.

24. The system of claim 1 wherein the risk assessment module calculates health based remedial goals (HBRGs) for the site.

5 25. The system of claim 24 wherein the HBRGs include remedial goals for maximum threshold levels of allowable remaining non-carcinogenic risks and remaining incremental lifetime cancer risks.

10 26. The system of claim 24 wherein the risk assessment module maps the HBRGs on the GIS map of the site, illustrating where COPC concentrations exceed the HBRGs on the site or ROI.

27. The system of claim 1 wherein the risk assessment module assesses human health risks based on the environmental data using one or more algorithms chosen from a list consisting of: US EPA's *Superfund Exposure Assessment Manual, Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, Human Health Evaluation Manual (Part A) Volume I in *Risk Assessment Guidance for Superfund*, and Environmental Evaluation Manual Volume II in *Risk Assessment Guidance for Superfund*.

15 28. The system of claim 1 wherein the remediation module screens remedial technologies by ranking an applicability score for each remedial technology.

20 29. The system of claim 1 wherein the remediation module screens remedial technologies by estimating a clean-up time for each remedial technology.

30. The system of claim 1 wherein the remediation module screens remedial technologies by calculating a cost for each remedial technology.

25 31. The system of claim 1 wherein the remediation module screens remedial technologies using algorithms in from US EPA's *Remediation Technologies Screening Matrix and Reference Guide, 4th Edition*.

32. The system of claim 1 wherein the interactive mapping interface includes links to the analysis module, the risk assessment module, and the remediation module.

30 33. The system of claim 1 wherein the application further includes a file management module that provides access, management and organization of site data, reports and files

and wherein the interactive mapping interface includes a link to the file management module.

34. The system of claim 1 wherein the application further includes a project management module that enables viewing, managing, setting and determining project resources, schedules and deadlines for planning clean-up projects at the site and wherein the interactive mapping interface includes a link to the project management module.

5 35. The system of claim 1 wherein the application further includes a collaboration module that provides a centralized online area for project team members to share non-project related files, discuss topics, exchange information, and conduct online meetings and wherein the interactive mapping interface includes a link to the collaboration module.

10 36. The system of claim 1 wherein the application further includes a calendar module that provides a calendar for scheduling projects and other appointments and wherein the interactive mapping interface includes a link to the calendar module.

37. The system of claim 1 wherein the application is a web-based application.

15 38. The system of claim 1 further comprising an application server that includes:
a memory, wherein the application is stored in the memory; and
a processor, connected to the memory, that runs the application.

39. The system of claim 38 wherein the application server is connected to a network, the system further comprising a plurality of user machines, connected to the network, that 20 provide access to the application run on the application server.

40. The system of claim 39 wherein the network is the Internet.

41. The system of claim 1 wherein the COPCs include one or more contaminants from a list consisting of: chemical, biological, radiological, and explosive contaminants.

42. A system for providing homeland security comprising:

25 a mapping module that generates an interactive graphical mapping interface of the site, the interactive mapping interface including links to environmental data, the environmental data including contaminants of potential concern (COPC) data;

a plurality of site monitoring systems that monitor COPC readings on the site, wherein the site monitoring systems provide real-time COPC readings; and

30 a continuous monitoring system module that provides a user interface to the site monitoring systems and the real-time COPC readings from the site monitoring systems.

43. The system of claim 42 wherein the continuous monitoring system provides an alert if the real-time COPC readings exceed a certain level.

44. The system of claim 43 wherein the alert is chosen from a list consisting of: an email, a text message, an instant message (IM), and a telephone call.

5 45. The system of claim 43 further comprising an analysis module that analyzes environmental data from the site and determines whether the real-time COPC readings exceed the certain level.

46. The system of claim 42 wherein the continuous monitoring system module generates a contour plot of real-time COPC readings on the site.

10 47. The system of claim 42 further comprising a three-dimensional (3D) viewer module that generates a 3D display of the site and the real-time COPC readings.

48. The system of claim 42 wherein the COPC data includes data about chemical, biological, radiological and explosive agents from the site.

49. A method for environmental data management, comprising:
15 analyzing contaminants of potential concern (COPC) data for an object of a site, wherein the object represents a physical location on the site for which COPC data is measured and stored;
 generating a three-dimensional (3D) display of the site, wherein the 3D display illustrates concentrations of COPCs at the site;
20 receiving a selection of a region-of-interest (ROI) in the 3D display;
 assessing health risks from COPCs in the ROI; and
 screening remedial technologies for cleaning up the COPCs in the ROI.

50. The method of claim 49 further comprising receiving a selection of a sampling period in the 3D display;

25 51. The method of claim 49 further comprising analyzing COPC data for the entire site.

52. The method of claim 50 wherein the analyzing COPC data for objects step includes:
30 receiving an object selection;
 retrieving COPC concentration readings for the selected object;
 receiving a screening query selection;

receiving an analyte selection, wherein the analyte is one of the COPCs for the selected object; and

analyzing the concentration readings for the selected analyte based on the selected screening query.

5 53. The method of claim 52 wherein the selected screening query is a standard, and the analyzing the concentration readings step compares the concentration readings for the selected analyte to the standard.

54. The method of claim 53 wherein the standard is a regulatory standard.

55. The method of claim 53 wherein the standard is a user-defined standard.

10 56. The method of claim 52 wherein the analyzing COPC data for objects step further includes displaying an object analyze webpage.

57. The method of claim 52 wherein the analyzing COPC data for objects step further includes receiving temporal limits, wherein the contaminant readings retrieved are limited by the temporal limits.

15 58. The method of claim 52 wherein the analyzing COPC data for objects step further includes receiving a sample matrix selection, wherein the contaminant readings are retrieved only for the sample matrix.

59. The method of claim 52 wherein the analyzing COPC data for objects step further includes displaying the results of the analyzing the concentration readings step.

20 60. The method of claim 49 further comprising generating an interactive graphical mapping interface of the site, the interactive mapping interface including links to the environmental data.

61. The method of claim 51 wherein the analyzing COPC data for the entire site step includes:

25 retrieving COPC concentration readings for the entire site;

 receiving a screening query selection;

 receiving an analyte selection, wherein the analyte is one of the COPCs for the entire site; and

 analyzing the concentration readings for the selected analyte based on the selected screening query.

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62. The method of claim 61 wherein the selected screening query is a standard, and the analyzing the concentration readings step compares the concentration readings for the selected analyte to the standard.

63. The method of claim 61 wherein the analyzing COPC data for the entire site step further includes receiving temporal limits, wherein the contaminant readings retrieved are limited by the temporal limits.

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64. The method of claim 61 wherein the analyzing COPC data for the entire site step further includes receiving a sample matrix selection, wherein the contaminant readings are retrieved only for the sample matrix.

10 65. The method of claim 61 wherein the analyzing COPC data for the entire site step further includes displaying the results of the analyzing the concentration readings step.

66. The method of claim 65 wherein the analyzing COPC data for the entire site step further includes receiving an analyte number limit selection, wherein the displaying step limits the results displayed by the analyte number limit selected.

15 67. The method of claim 65 wherein the displaying step displays the results on an interactive mapping interface.

68. The method of claim 49 wherein the assessing health risks step includes receiving a ROI selection;

receiving a media type selection;

20 receiving a selection of COPCs for which risk is assessed;

receiving a toxicity factor selection;

receiving a selection of one or more receptors and one or more exposure pathways for the risk assessment;

receiving a threshold selection; and

25 determining whether a risk output or health-based-remedial-goal (HBRG) output is selected.

69. The method of claim 68 wherein the assessing health risks step further includes:

retrieving ROI, media, and selected COPC data based on the received selections;

30 performing a risk output assessment per the retrieved data and the selected toxicity factors, receptor(s), pathway(s), and threshold;

generating a risk report based on the risk output assessment, wherein the risk report details carcinogenic and non-carcinogenic risks from the selected COPCs in the ROI.

70. The method of claim 68 wherein the assessing health risks step further includes:

5 retrieving ROI, media, and selected COPC data based on the received selections; performing a HBRG output assessment per the retrieved data and the selected toxicity factors, receptor(s), pathway(s), and threshold;

generating a HBRG report based on the HBRG output assessment, wherein the HBRG report includes HBRGs for the selected COPCs in the ROI.

10 71. The method of claim 68 wherein the receiving a selection of COPCs step includes: determining if COPC(s) for the risk assessment are manually or automatically selected (block 384);

if manually selected, receiving a manual selection of the COPCs; and

if automatically selected, receiving automatic selection parameters and selecting

15 the COPCs based on the automatic selection parameters.

72. The method of claim 68 wherein the receiving toxicity factors step includes receiving a federal or state toxicity factor selection.

73. The method of claim 68 wherein the receiving a target threshold selection includes receiving hazard quotient (HQ) and incremental-lifetime cancer risk (ILCR) threshold 20 selections.

74. The method of claim 68 wherein the assessing health risks step further includes receiving and saving changes to receptor parameters.

75. The method of claim 49 wherein the screening remedial technologies step includes:

25 receiving a selection of a ROI;

receiving a selection of a score limit;

retrieving environmental data, including COPC data, for the selected ROI;

scoring applicable remedial technologies based on the retrieved environmental data; and

30 generating an initial screening report that lists the applicable remedial technologies that are scored at or above the score limit.

76. The method of claim 75 wherein the screening remedial technologies step further includes:

estimating a clean-up time for each applicable remedial technology in the screening report; and

5 generating a comprehensive screening report that lists the applicable remedial technologies and the estimated clean-up time for each.

77. The method of claim 75 wherein the screening remedial technologies step further includes:

generating and displaying a cost calculator for calculating the costs of cleaning up
10 the COPCs in the ROI with the applicable remedial technologies;

performing a cost calculation on selected applicable remedial technologies; and
selecting one of the applicable remedial technologies.

78. A computer-readable medium comprising instructions for performing the method of claim 49.

15 79. A computer-readable medium comprising instructions for performing the method of claim 51.

80. A computer-readable medium comprising instructions for performing the method of claim 61.

20 81. A computer-readable medium comprising instructions for performing the method of claim 68.

82. A computer-readable medium comprising instructions for performing the method of claim 69.

83. A computer-readable medium comprising instructions for performing the method of claim 70.

25 84. A computer-readable medium comprising instructions for performing the method of claim 75.

85. A graphical user interface for environmental data management, comprising:
an interactive geographic information system (GIS) map of the site, wherein the map includes links to objects displayed on the map, wherein an object represents a
30 physical location on the site for which environmental data is measured and stored;
a site data section that includes site data;
an object data section that includes data about a selected object from the site; and
a plurality of selectable buttons corresponding to modules, including:

an analysis module that analyzes environmental data from a site, the environmental data including contaminants of potential concern (COPC) data;

a three-dimensional (3D) viewer module that generates a 3D display of the site and the environmental data.

5 a risk assessment module that assesses the human health risks caused by COPCs at the site; and,

a remediation module that screens remedial technology for cleaning up COPCs.